

**Republic of Iraq  
Ministry of Higher Education  
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# **COMPARISON OF SHEAR BOND STRENGTH OF THREE DIFFERENT BRACKETS TYPES BONDED ON ZIRCONIUM SURFACES (IN VITRO STUDY)**

**A thesis**

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## Abstract

With the increased in the demands of orthodontic treatment, the challenge of direct bonding to non-enamel surfaces (zirconium) had been increased.

The present study was carried out to compare the shear bond strength of three different brackets (stainless steel, sapphire and composite) bonded to zirconium surface and study the mode of bond failure.

The sample was comprised of 30 models ( $8\text{mm} \times 6\text{mm} \times 1.5\text{mm}$ ) of full contour zirconium veneers of upper right central incisor. They were divided into three groups according to the brackets type; all samples were treated first by sandblast with aluminum oxide particle  $50\mu\text{m}$  then coated by z-prime plus primer. A central incisor bracket of each group was bonded to the prepared zirconium surface with light cure adhesive resin (Transbond TM XT, 3M Unitek, USA).

Shear bond strength was measured by using Tinius Olsen universal testing machine at crosshead speed of  $0.5\text{mm/min}$ . After debonding, each bracket and zirconium surface were examined using magnifying lens (10X) and adhesive remnant index was recorded. The difference in shear bond strength between main groups was analyzed by using ANOVA at  $p \leq 0.05$ .

The result revealed high significant difference among all tested groups and the highest value was for sapphire brackets ( $7.49 \pm 1.45\text{Mpa}$ ) of all groups followed by stainless steel brackets ( $6.46 \pm 1.43\text{Mpa}$ ) and composite brackets had the least value ( $4.35 \pm 0.72\text{Mpa}$ ). Non-significant difference in the site of bond failure among all groups of brackets and zirconium-adhesive interface failure was the predominant.

In conclusion, the new zirconium prime plus primer can be successfully used in bonding stainless steel and sapphire brackets to zirconium surface.